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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Yukio Sakashita

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EXAMINER

BLUM, DAVID S

ART UNIT

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2813

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/542,956	Applicant(s) SAKASHITA, YUKIO	
	Examiner DAVID S. BLUM	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/10/06, 6/7/06</u> | 6) <input type="checkbox"/> Other: _____ |

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This action is in response to the election filed 10/3/08.

DETAILED ACTION

1. Applicant's election with traverse of claims 1-14 in the reply filed on 10/3/08 is acknowledged. The arguments were found persuasive. All Claims will be examined.

Claim Objections

2. Claims 7-10, 12, 14-15, and 20-24 objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim can not depend upon another multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 7-10, 12, 14-15, and 20-24 not been as best understood by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nibou (Chemical Fabrication $\text{SrBi}_4\text{Ti}_4\text{O}_{15}$) in view of Desu (EP000877100A1).

Regarding claim 1, Nibou teaches a bismuth layer of the formula in claim 1, with m= to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2). Nibou is

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silent as to the orientation of the C-axis, however the instant specification teaches that if $m=2, 4, \text{ or } 6, \text{ or } 8$, the crystal structure will have the C-axis oriented vertically to a substrate surface (paragraphs 0015, 0022-0024). Nibou meets that criteria.

Nibou teaches the material may be used for non-volatile memory devices, but is silent as to using the layer as a thin film capacitance element. Desu teaches the material is used as the layer as a thin film capacitance element.

Regarding claim 2, Nibou teaches the excessive content of Bi in the range of 0.4-0.5 mol (3.2).

Regarding claim 3, Nibou teaches a bismuth layer of the formula in claim 3, with $m=$ to an even number (1 Introduction) and an excess of bismuth in 0-2.0 mol (3.2). Nibou is silent as to the orientation of the C-axis, however the instant specification teaches that if $m=2, 4, \text{ or } 6, \text{ or } 8$, the crystal structure will have the C-axis oriented vertically to a substrate surface (paragraphs 0015, 0022-0024). Nibou meets that criteria.

Nibou teaches the material may be used for non-volatile memory devices, but is silent as to using the layer as a thin film capacitance element. Desu teaches the material is used as the layer as a thin film capacitance element.

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Regarding claim 4, Nibou teaches a bismuth layer of the formula in claim 4, with $m =$ to an even number (1 Introduction) and an excess of bismuth in a ratio of 1-1.5 as compared to Ti (3.2 With no excess, ratio is 1:1, with excess <1). Nibou is silent as to the orientation of the C-axis, however the instant specification teaches that if $m=2, 4, \text{ or } 6, \text{ or } 8$, the crystal structure will have the C-axis oriented vertically to a substrate surface (paragraphs 0015, 0022-0024). Nibou meets that criteria.

Nibou teaches the material may be used for non-volatile memory devices, but is silent as to using the layer as a thin film capacitance element. Desu teaches the material is used as the layer as a thin film capacitance element.

Regarding claim 5, Nibou teaches a bismuth layer of the formula in claim 5 with the exception of Ca and Ba additions, with $m =$ to an even number (1 Introduction) and an excess of bismuth in 0-0.5 mol (3.2). Nibou is silent as to the orientation of the C-axis, however the instant specification teaches that if $m=2, 4, \text{ or } 6, \text{ or } 8$, the crystal structure will have the C-axis oriented vertically to a substrate surface (paragraphs 0015, 0022-0024). Nibou meets that criteria.

Nibou teaches the material may be used for non-volatile memory devices, but is silent as to using the layer as a thin film capacitance element. Desu teaches the material is used as the layer as a thin film capacitance element. Desu also teaches the additions

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of Ca and Ba as layered perovskites with improved fatigue retention (page 2 lines 20-23).

One skilled in the art would modify Nibou with the addition of Ca and Ba as taught by Desu with the with benefit of improved fatigue retention (page 2 lines 20-23).

Regarding claim 6, Desu teaches improved fatigue retention with the addition of La (pervoskite metal oxides page 2 lines 25-30).

Regarding claim 7, Nibou is silent as to the C-axis orientation being 80% or more, but as the instant specification teaches that if $m=2, 4, \text{ or } 6, \text{ or } 8$, the crystal structure will have the C-axis oriented vertically to a substrate surface (paragraphs 0015, 0022-0024). Nibou meets that criteria. Therefore, by meeting the material formula, absence any teaching to the contrary, Nibou is considered to meet this limitation.

Regarding claim 8, the limitation of leakage current density at a given electric field density reflects usage and not the device structure itself. Therefore, it is given no patentable weight. Further, as the materials are the same, the same physical properties would result.

Regarding claim 9, the limitation of average rate of change of a capacitance against a temperature range reflects usage and not the device structure itself. Therefore, it is

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given no patentable weight. Further, as the materials are the same, the same physical properties would result.

Regarding claim 10, Desu teaches a thin film capacitance element, therefore Desu teaches a lower electrode, a dielectric thin film and an upper electrode (claim 7). The thin film is as any of claims 1-9.

Regarding claim 11, Nibou teaches a thin film of 20-30nm (3.2).

Regarding claim 12, Desu teaches a plurality of dielectric films of claims 1-9, are alternately stacked among the electrodes.

Regarding claim 13, Nibou teaches a thin film of 20-30nm (3.2).

Regarding claim 14, Nibou and Desu teach the bismuth layer as in claims 1-9.

Regarding claim 15, Nibou teaches a coating step and a firing step, and Desu teaches a coating step and a firing step and that the Bi layer is coated upon a lower electrode.

Regarding claim 16, Nibou teaches an early stage of the thermal process (drying) and a final firing step.

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Regarding claim 17, Nibou teaches additional coating steps (as does Desu) prior to the final firing. Although not stated, the additional coating steps would have to be after a drying step to maintain the first coat.

Regarding claim 18, Desu teaches that if the desired thickness is not achieved after multiple coat/dry cycles and after baking, additional layers may be placed after baking.

Regarding claim 19, Desu teaches that if the desired thickness is not achieved after multiple coat/dry cycles and after baking, additional layers may be placed after baking, thus coating, drying and firing are repeated.

Regarding claim 20, Nibou teaches a final firing at 700-900 degrees C and Desu at 750 degrees C.

Regarding claim 21, Nibou dries at 350 degrees C.

Regarding claim 22, the temperature of the preliminary firing is 700-900.

Regarding claim 23, Nibou teaches a thin film of 20-30nm (3.2).

Regarding claim 24, after forming the dielectric, Desu teaches forming an upper portion electrode. As Desu teaches annealing in an oxygen atmosphere (column 7 line 31), it is

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clear both the lower electrode and dielectric are treated in oxygen. It would be obvious to one skilled in the art that the lower electrode, dielectric layer, and upper electrode would be thermally treated in the oxygen atmosphere.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (571)-272-1687) and e-mail address is David.blum@USPTO.gov .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Landau, can be reached at (571)-272-1731. Our facsimile number all patent correspondence to be entered into an application is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/David S Blum/

Primary Examiner, Art Unit 2813

April 2, 2009